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The Effects of Commercial Fishing
Through the Ice on a Winter Congregation
of Channel Catfish (*Ictalurus punctatus*)
and Flathead Catfish (*Phlodictis olivaris*)
in Pool 7 of the Mississippi River *

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ABSTRACT

A total of 5,747 catfish (>12 inches) were tagged in Pool 7 of the Mississippi River for the purpose of evaluating harvest of winter catfish congregations. Insufficient data obtained during the winter of 1973 and poor success with the disc tag resulted in an additional year of study and conversion to the floy tag.

A known winter catfish schooling site in the north end of Pool 7 was chosen for study. Netting of the congregation revealed its composition was of equal proportions of fish from that area and from areas downstream. All fish tagged from the winter school were recaptured elsewhere. The time of formation of the congregation was during December or January. The school remained present at ice-out in late March. A Peterson estimate of the congregation in 1974 was 5,300. Less than three percent were harvested in two seine hauls.

In general, commercial, winter harvest of catfish in Pool 7 is low. The recent average winter harvest figure of 543 pounds is less than one percent of the average, total annual commercial harvest of 67,652 pounds.

It was determined 590,000 pounds of commercial size catfish exist in Pool 7 of the Mississippi River. Catch curve analysis found the present total annual mortality rate to be 48.2 percent. Of this, 12.2 percent is due to fishing and 36.0 percent to natural mortality. Increased harvest, even of winter concentration areas, would not harm the present catfish fishery, however, optimum rate of harvest is not known.

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INTRODUCTION

Catfish in the Mississippi River show a behavioral pattern of schooling in certain deep water areas under the ice. Such congregations are susceptible to harvest by foul hooking and commercial seining. The primary objective of this study is to evaluate the present commercial fishing regulations on winter catfish congregations.

One such congregation area in Pool 7 was chosen to evaluate the significance of harvesting winter catfish congregations. Data was collected to determine: 1) The areas within Pool 7 from where catfish emigrate to form the congregation, 2) The date of formation and dispersion of the catfish congregation, 3) The population size of the congregation, and 4) The harvest of catfish during the winter congregation period by various gear.

In addition, tag returns were used to determine a population estimate, an exploitation rate, and movement of the catfish in Pool 7.

METHODS

Study Area

Pool 7 of the Mississippi River, which has a known winter schooling site for catfish in its upper region, was selected as a study area. This pool has an area of 11,031 acres, extending 11 miles between Trempealeau, Wisconsin, and Dresbach, Minnesota (Olson and Meyer, 1976).

Tagging

Several means of obtaining catfish for tagging were employed. From April to November baited slat and hoop nets were used. Netting effort was located to distribute the sources of tagged fish throughout Pool 7 (Figure 1). Just prior to the formation of ice cover, in November, trawling was conducted in the known winter concentration area. With the formation of adequate ice cover, unbaited slat and hoop nets and commercial seines were fished in the concentration area. Horizontal scanning sonar equipment was used to locate schooled fish under the ice, to aid in net placement and monitor seining activity.

Only catfish 12 inches and larger were tagged as smaller fish suffered high losses from handling and tagging. From August, 1972, through July, 1973, disc tags were used. Initially plastic discs were attached with plastic filament anchors under the dorsal fin. This method was found to have an undesirable tendency to foul in underwater objects, including nets. Also, considerable irritation was noted in some tagged fish, particularly the smaller ones. Potential problems of tag loss and infection were likely.

Substitution of stainless steel wire for anchoring the tag under the bone anterior to the dorsal spine reduced tag loss, but did little to improve irritation and injury. Tagging from August, 1973, through August, 1974 was done with a floy anchor tag. This reduced the injury and snagging properties of the disc tag.

Tag Returns

Pool 7 was divided into six areas to record where catfish were tagged and recaptured (Figure 1). Tags were returned by commercial and sport fishermen as well as by department nets. A one dollar reward was offered. Immigration and emigration from the winter concentration area were analyzed, as well as general movement within and emigration from the pool.

Population Estimate and Harvest

Bailey's modification of the Peterson Index and the Schnabel Method were used to estimate the population size of the winter catfish congregation during 1974 (Ricker, 1975). The Peterson method was also used to calculate an estimate of the commercial catfish population in Pool 7. This estimate was based only on those fish tagged with floy tags during the fall of 1973 (August 17 - October 30). The following reasons restricted tagging to this time period. Disc tagged fish were eliminated because of the disc tags' undesirability as a fish tag. The winter, 1974, floy tagged fish were excluded as they were all tagged within a small area, the winter concentration site. Spring and summer, 1974, floy tagged fish were not included because they were not available to the fishery during the complete period when tag returns were counted, May - November, 1974. Of the fall, 1973, floy tagged catfish, a 20 percent natural mortality rate was applied to account for over winter mortality, prior to May when fishing effort increased. The assumption is made that the 39 percent natural mortality rate (Table 7) is constant year round. An adjustment was also made for tag loss due to a 12 percent rate of emigration from the pool during the period of recapture. A factor was not available for tag loss resulting from other sources (eg. tagging mortality, nonreturned tags). As a 15 inch size limit exists on the commercial fishery, those fish from 14.0 to 14.9 inches were included as marked fish to account for recruitment (Ricker, 1975). The catch figure used in the estimate was provided by commercial fishing statistics (Fernholz and Crawley, 1974; UMRCC, 1976) and an estimate of sport harvest from 1962 and 1967 creel census data (Finke, 1964; Wright, 1969). The number of recaptures was tabulated from tag returns from fish caught during 1974.

The ratio of tag returns to number marked as well as a comparison of the pounds harvested annually to pounds of catfish available give an exploitation rate (Ricker, 1975). A total annual mortality rate was calculated by imposing the mean annual growth rate on a catch curve of channel catfish captured during 1972-1974 (Ricker, 1975). Mean annual growth rate for commercial size channel catfish of Pool 7 was available from a 1964 age-growth study (Finke, 1965).

RESULTS

Tagging

A total of 5,747 catfish were tagged and released in Pool 7 from August, 1972, through August, 1974. Most were captured in hoop nets (4,037). Slat nets accounted for 1,352 with November trawling efforts in 1972 and 1973 producing only 22. Three commercial seine hauls during the two winters yielded 336 catfish tagged and released, plus 55 of legal seine haul size (20 inches and larger) which were sold commercially.

In general, the largest catches came from the border of the main channel and sloughs and side channels adjacent to it. Backwater lakes and sloughs farther from the main channel were less productive. This may reflect the relative effectiveness of netting gear used in the respective areas, rather than their significance as catfish habitat. For example, some of the most productive areas for commercial setlining did not yield high catches with bait nets.

The greatest number of catfish (2,065) were caught in area 1, the uppermost main channel section of the pool. This was one-third of the total. Areas 3, 4, and 6 also contained main channel habitat and produced substantial portions of the catch. Area 3 was the next most productive area with 1,494 catfish tagged, one-fourth of the total, followed by 840 from area 4 and 684 from area 6. The two areas most distant from the main channel had the smallest catches, 392 in area 5 and 272 in area 2.

During both years, most fish were tagged in the late summer and early fall; August 2,391, September 1,144, and October 590. Fall trawling in November produced only 22 fish. Fishing under the ice in January, February, and March resulted in 784 tagged catfish. A total of 816 were caught in the spring and early summer; May 67, June 500, and 249 in July.

Recapture

From date of tagging until December 31, 1976, 352 of the disc tags and 301 of the floy tags have been returned. The method of recapture is listed for each type in Table 1. Greater than 70 percent of both tag type returns were captured from gill net and setline fishing. However less than one percent of the returned floy tagged fish were captured by gill net, compared to 44.7 percent for the disc tags. The large mesh size restriction (greater than 7 inch stretch mesh) and the susceptibility of the disc tags to entangle account for this difference. Sport fishermen returned 10.2 percent of the disc tag returns and 6.7 percent of the floy tag returns. Department of Natural Resources' trap nets caught 3.1 percent of the disc tag returned fish and 8.4 percent of the floy tag returns.

Commercial trap nets accounted for 2.7 percent of the floy tag returns. These were from fish which emigrated to Wisconsin-Iowa waters. No returns of disc tags were recorded by commercial trap nets. Of the disc tagged fish, 3.1 percent of the returns were caught by seining and 1.4 percent found dead, compared to 1.3 percent of the floy tags by seining. No floy tagged fish were found dead. The method of recapture was not known for 4.8 percent of the returned disc tags and 9.0 percent of the floy variety.

The location of recaptures by study areas is summarized in Table 2 for each tag type. Of the disc tagged fish, 88.9 percent of the recaptures were recaptured within Pool 7; 30.1 percent within the original area tagged and 58.8 percent in other areas. This compared to 79.0 percent for returned floy tags recaptured in Pool 7; 20.1 percent from the original area tagged and 58.9 percent from other areas within the pool. Returned disc tags from fish captured outside Pool 7 was 7.7 percent, whereas the value was 14.0 percent for floy tags. Unknown location of recapture was 3.4 percent for disc tags and 7.0 percent for floy tags returned.

Seasonal tag return was reflective of fishing pressure. A detailed record of recapture dates was not possible as many fishermen did not record the actual dates that fish were caught. In general, almost all recaptures occurred during the setline and sport fishing season, May through October.

Other parameters of tag return were evaluated (Tables 3 and 4). Three periods of tagging were established for each tag type; fall (August-December), winter (January-March), and spring-summer (April-August) for the respective years. The percent of tag returns per tagging period, per tag type and versus year of recapture were analysed. The emigration of returned tags from Pool 7 versus year of recapture was also noted. The year of recapture and/or location were not known for all returns.

Disc Tags (Table 3)

Of the catfish that were disc tagged during the fall of 1972, 180 tags or 8.9 percent were returned. A total of 9.4 percent of these recaptures occurred during 1972. An additional 77.8 percent were returned during 1973, summing to a cumulative total of 87.2 percent. During 1974, 2.2 percent were returned and in 1975 the remaining 10.6 percent were returned. No returns were recorded in 1976. Of 17 returns during 1972, 18 percent were captured outside Pool 7. During 1973, 5 percent of the 140 had emigrated. A low 1974 sample size of 4 showed 50 percent emigration. All of the 19 recaptures during 1975 were within the pool.

There were 42 returns, 28.2 percent, of the winter, 1973 disc tagged group. Of these, 92.9 percent were returned during 1973. Of the remainder, 2.4 percent were returned in 1974 and 4.7 percent in 1975. No returns occurred in 1976. Emigration of the 39 returns during 1973 was 8 percent. The sample size was too small, 3 fish, during 1974 and 1975 to evaluate emigration.

Spring and summer 1973, disc tagged fish showed a total return of 17.5 percent or 103 fish. During 1973, 33.8 percent were returned. In 1974, 43.7 percent were recaptured, totaling to 76.7 percent by this time. Another 20.4 percent were returned during 1975 and 2.9 percent in 1976. From a sample size of 34 returns in 1973, 6 percent had emigrated from Pool 7. This increased to 11 percent of the 45 returns in 1974. Of the 21 fish in 1975, 5 percent were emigrants. Three of the four recaptures in 1976 had emigrated.

Floy Tags (Table 4)

There were 134 returns or 8.5 percent of the fish tagged with floy tags during the fall of 1973. Only 6 fish, 4.5 percent, were recaptured during the remainder of 1973. This increased to 64.2 percent in 1974. The returns in 1975 amounted to 24.6 percent of the total returned with the remaining 6.7 percent returned in 1976. Emigration was 17 percent during 1973 but only 6 fish were recaptured. Of the 86 recaptures in 1974, 12 percent had emigrated. In 1975 movement out of the pool was 6 percent of 33 fish. The 9 returns in 1976 showed a 33 percent emigration rate.

Winter, 1974 floy tags showed a return of 15.2 percent or 79 recaptures. Almost half, 49.4 percent, were caught in 1974. During 1975, 39.2 percent were recaptured, totaling to 88.6 percent returned by the end of the year. The remaining 11.4 percent of the recaptures were returned in 1976. Eight percent of the 39 returns in 1974 were emigrants. Emigration increased to 10 percent of 31 fish returned in 1975. Of the 9 recaptures in 1976, 22 percent had left the pool.

Fifty-eight of the floy tagged, spring-summer 1974 fish were caught, for a 6.4 percent return. Exactly half were returned in 1974. An additional 46.5 percent were recaptured in 1975, with the remaining 3.5 percent in 1976. Emigration was 3 percent of the 29 tags in 1974. Seven percent of 27 returns in 1975 had emigrated and the two recaptures in 1976 were within Pool 7.

The percent of tag returns analysed per tagging period and per tag type as well as tag return and emigration of returned tags versus time are summarized. The highest return rate occurred for winter tagged fish (19.7 percent). The spring-summer tagging period showed a slightly higher return rate (10.9 percent) than the fall tagged fish (8.7 percent).

Disc tags had a higher overall return rate than floy tags, 11.8 percent as compared to 9.0 percent. This discrepancy may be accounted for by the disc tag's greater susceptibility to snagging. The greatest percentage of tag returns occurred within two years after tagging. All but one of the tagging periods showed returns greater than 88 percent by this time. Fish tagged in the fall showed a low percent return rate (<10 percent) during the remaining months of the year in which tagging occurred. No relationship could be determined for percent emigration of tag returns over time. Of seven time intervals, with a sample size greater than 16 returns in both years compared, four showed a decrease and three an increase over the period 1972 to 1975.

Catfish Movement Associated With the Winter Congregation

Tag returns gave information as to movement in and out of the winter congregation area under study. Of the 11 tagged fish recaptured from the 1973 congregation, five had been recently tagged and released into the concentration area. The remainder were tagged earlier in the fall, four in the congregation area and two four miles downstream. During 1974, netting also produced 11 returns. Eight of these had been recent releases into the congregation. The other three had been tagged during the fall of 1973, one just below the congregation area and two five miles downstream.

All of the recaptured catfish tagged from the winter concentration were recaptured elsewhere. Of the 19 recaptures from the 1973 congregation, 14 were caught two to three miles downstream. Four were taken seven miles downstream and two ten miles downstream, all within Pool 7. One return was caught 51 miles downstream. Of the two recaptures from the 1974 congregation, one was caught 10 miles downstream and the other 45 miles upstream.

An attempt was made to determine the date of formation and dispersal of the winter congregation. November trawling in the concentration area, prior to freeze-up, was not successful in capturing many catfish either year. Sampling was not possible from November until late January due to unsafe ice. Considerable trap net catches in late January indicated the school had formed by then. Large catches at the time nets were removed, just before ice-out in March, indicated the school was still intact at this time.

Size and Harvest of the Winter Concentration

Insufficient data was available the first winter to estimate the population size of the congregation. Better results were obtained during 1974. Department netting from January 17 to February 31 resulted in 286 catfish tagged and released.

A commercial seine haul on February 22 yielded 92 fish of which four were marked. The population, calculated by the Peterson method, was 5,320. Confidence limits at the 95 percent level were 2,375 and 13,299. Using the Schnabel method, the population size was 2,370 with 95 percent confidence limits ranging from 1,309 to 4,740 (Table 5).

Seining was the only method used to harvest the winter catfish concentrations. A total of three hauls were made. In 1973 one commercial haul caught 187 fish weighing 180 pounds. Two hauls in 1974 caught 92 and 57 fish. A ten year average (1966-1975) of winter, commercial harvest by Wisconsin fishermen in Pool 7 amounts to 212 pounds taken by gill netting and 331 pounds from seining. The total annual winter harvest is 543 pounds (Table 6).

Population Estimate and Harvest of Catfish in Pool 7

A population estimate of the commercial sized catfish in Pool 7 was based on 687 marked fish. Recaptures amounted to 78 of the 34,437 fish caught. The total number caught was obtained by dividing the total weight (Finke, 1964; Wright, 1969; Fernholz and Crawley, 1974; UMRCC, 1976) by the average weight of the commercial size catfish, 1.97 pounds (Finke, 1965). The population was then estimated to be 299,480 fish weighing 589,976 pounds. Confidence limits of 95 percent are 240,338 fish weighing 473,466 pounds and 373,169 fish at 735,143 pounds. Per acre the values are 27.2 fish or 53.5 pounds. Similar confidence limits are 21.8 catfish, weighing 42.9 pounds and 33.8 fish at 66.6 pounds (Table 7).

The annual commercial harvest of catfish from Pool 7 during a ten year period from 1965-1974 ranged from 39,457 to 89,338 pounds with an average of 67,652 pounds (Table 8; UMRCC, 1967-1976). Sport fishermen account for an additional average, annual harvest of 4,604 pounds (Finke, 1964; Wright, 1969). This totals to 72,256 pounds annually (Table 7). The ratio of the average annual harvest to the estimated standing crop of commercial size catfish results in an annual harvest rate of 12.2 percent. Exploitation based on a ratio of recaptured to marked fish compares favorably at 11.4 percent.

A catch curve of 4,700 channel catfish, greater than 13 inches, was constructed (Figure 2). Using a mean annual growth increment of 2.0 inches (Finke, 1965), total annual mortality equals 48.2 percent.

DISCUSSION

Winter Congregation

The commercial harvest of schooled catfish during ice cover was the primary concern of this study. Various aspects of a known winter concentration in Pool 7 were studied.

Limited data was available to determine areas of Pool 7 from where fish migrate to form the concentration area under study. Winter fishing in 1973 resulted in six recaptures from fish tagged the previous fall. Four had been caught in the concentration area while the other two were captured four miles downstream. Netting of the 1974 school produced three returns from fish tagged prior to formation of the concentration. One was from the congregation area and two five miles downstream. In general, composition of the concentration area was of equal proportions of fish from that area and from areas downstream.

Dispersal of fish from the concentration area was widespread. All recaptured fish (19) had left the area and moved a minimum distance of two miles. Seventeen had remained in the pool, two had emigrated.

Tag returns from winter gill netting in 1973 indicate two other sites of possible winter schooling areas. A location just east of Dresbach Island produced 17 returns and an area along the eastern border of the main channel between Pigeon Island and Hammonds Chute reported 22 recaptures (Figure 1).

The formation of the winter school occurred during December or January. Trawling of the concentration area in November indicated an absence of catfish. Unsafe ice excluded sampling prior to late January. At that time trap netting was successful. Dispersal occurred after ice-out in late March. Just prior to that time large catches were taken, indicating the school was still intact.

A population estimate of the 1974 concentration was estimated to contain approximately 5,300 fish (Table 5). The size of this congregation area was estimated to be 100 meters in diameter. Two commercial seine hauls in 1974 resulted in a minimal harvest of the congregation. Only 149 catfish of the estimated 5,300 were caught, less than three percent. Seining was the only gear evaluated.

Present commercial, winter harvest of catfish by Wisconsin fishermen in Pool 7 when compared to the annual harvest is low. The recent average winter harvest of 543 pounds (Table 6) amounts to less than one percent of the average total annual commercial harvest, 67,652 pounds (Table 7). This winter harvest of 543 pounds when compared to the average annual sport catfish harvest of 4,604 pounds (Table 7) is also low, 11.8 percent.

Catfish Harvest Rate for Pool 7

An estimate of 590,000 pounds of commercial size catfish exist in Pool 7 of the Mississippi River. It should be noted the number of fish marked for the population estimate falls far short of the required number for even 50 percent accuracy (Robson and Regier, 1964). Of this estimate, a total of 12.2 percent are harvested annually; 11.4 percent by commercial fishermen and 0.8 percent by sport fishermen. Rate of exploitation as determined by tag returns, 11.4 percent, supports the above calculation. The total annual mortality rate of 48.2 percent can be divided into 12.2 percent attributed to fishing and 36.0 percent from natural causes. In the absence of fishing, a natural mortality rate of 39 percent would exist (Ricker, 1975; Table 7). An increase in the present harvest rate would reduce a certain portion of the old age fish in the population, however, would allow for increased sustained yield. It is felt increased harvest, even of winter concentration areas, would not harm the present fishery. However, data is insufficient to calculate the optimum rate of harvest. A more accurate population estimate along with growth and mortality rates for all age classes of the catfish population would be necessary.

Movement

Knowledge of catfish movement, within a system such as the Mississippi River, is an important aspect of its biology and management. Floy and disc tag returns revealed that 20 and 30 percent, respectively, of the fish were recaptured within the same area as tagged. Values of 7.7 percent (disc tag) and 14.0 percent (floy tag) were estimated to have emigrated from Pool 7 (Table 2). Variability in the rates may have been partially influenced by the susceptibility of the disc tags to gill net snagging.

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Table 1. Gear used to capture tagged catfish from August, 1972 through December, 1976.

Gear	Disc Tag		Floy Tag	
	Number Recaptured	Percent of Total Recaptures	Number Recaptured	Percent of Total Recaptures
Gill net	155	44.2	2	0.6
Setline	117	33.2	219	72.7
Sportfishing	36	10.2	20	6.7
DNR trap nets	11	3.1	21	7.0
Commercial trap nets	0	0	8	2.7
Seine	11	3.1	4	1.3
Found dead	5	1.4	0	0
Unknown	17	4.8	27	9.0
	352		301	

Table 2. The location of recaptured catfish, by study areas, caught from August, 1972, through December, 1976.

DISC TAGS

Number of Tag Returns Per Study Area		Study Area Where Tagged	Percent Recapture Per Location			
Area	Number Returned		Within Same Area As Tagged	Within Pool 7 Area Other Than Area Tagged	Outside Pool 7	Unknown Location
1	154	1	29.2%	61.0%	8.4%	1.4%
2	11	2	27.3	63.6	9.1	0
3	87	3	31.0	59.8	4.6	4.6
4	45	4	33.3	48.9	6.7	11.1
5	30	5	20.0	73.3	6.7	0
6	25	6	40.0	40.0	16.0	4.0
		Average	30.1%	58.8%	7.7%	3.4%

FLOY TAGS

Number of Tag Returns Per Study Area		Study Area Where Tagged	Percent Recapture Per Location			
Area	Number Returned		Within Same Area As Tagged	Within Pool 7 Area Other Than Area Tagged	Outside Pool 7	Unknown Location
1	135	1	15.6%	54.8%	22.2%	7.4%
2	4	2	75.0	0	0	25.0
3	81	3	19.8	66.6	11.1	2.5
4	36	4	27.8	63.9	0	8.3
5	10	5	10.0	80.0	10.0	0
6	33	6	27.3	51.5	6.1	15.1
		Average	20.7%	58.9%	14.0%	7.0%

Table 4. Floy tag returns for years 1973 through 1976.

Period Tagged	Percent Recapture For Tagging Period	YEAR OF RECAPTURE					
		1973		1974		1975	
		Within Pool 7	Outside Pool 7	Within Pool 7	Outside Pool 7	Within Pool 7	Outside Pool 7
1. Fall - 1973	$\frac{\text{Recaptured}}{\text{Tagged}} = \frac{134}{1574} = 8.5\%$						
Number of tags recaptured		5	1	76	10	31	2
% emigration of returns			17%		12%		6%
% recapture during year of the total recapture		4.5%		64.2%		24.6%	
% cumulative recapture of the total recapture		4.5%		68.7%		93.3%	
2. Winter - 1974	$\frac{\text{Recaptured}}{\text{Tagged}} = \frac{79}{518} = 15.2\%$						
Number of tags recaptured		-	-	36	3	28	3
% emigration of returns			-		8%		10%
% recapture during year of the total recapture			-	49.4%		39.2%	
% cumulative recapture of the total recapture			-	49.4%		88.6%	
3. Spring-Summer - 1974	$\frac{\text{Recaptured}}{\text{Tagged}} = \frac{58}{901} = 6.4\%$						
Number of tags recaptured		-	-	28	1	25	2
% emigration of returns			-		3%		7%
% recapture during year of the total recapture			-	50.0%		46.5%	
% cumulative recapture of the total recapture			-	50.0%		96.5%	
Total Floy Tag Percent Recapture	$\frac{\text{Recaptured}}{\text{Tagged}} = \frac{271}{2993} = 9.0\%$						

Table 5. Population estimate of the 1974 winter catfish congregation.

PETERSON METHOD (Bailey's Modification)

Date	\hat{N}	95% Confidence Limits
	= 5,320	
February 22		\hat{N} = 2,375
		\hat{N} = 13,299

SCHNABEL METHOD

Date	\hat{N}	95% Confidence Limits
February 14	2,596	927 - 4,720
February 18	2,920	1,068 - 7,300
February 21	4,920	1,800 - 12,300
February 22	3,641	1,807 - 7,964
February 28	4,843	2,516 - 10,196
March 4	2,370	1,309 - 4,740

Table 6. Winter commercial catfish harvest in Pool 7.*

<u>Year</u>	<u>Gill Net</u>	<u>Seine</u>
1975	583 lbs.	72 lbs
1974	862	166
1973	96	79
1972	163	112
1971	0	310
1970	94	976
1969	145	93
1968	33	335
1967	275	617
1966	81	882
Average	212 lbs.	331 lbs.
Total	543 lbs./year	

* Wisconsin Commercial Fishery Statistics.

Table 7. Statistics - Catfish Fishery - Pool 7.

Population estimate of commercial catfish:

<u>Number</u>	<u>Number/Acre</u>	<u>Pounds/Acre</u>	<u>Total Pounds - Pool 7</u>
299,480	27.2	53.5	589,976
95% Confidence Limits			
240,338	21.8	42.9	473,466
373,169	33.8	66.6	735,143

Mean Annual Commercial Harvest (1965-1974)	67,652 lbs.
Mean Annual Sport Harvest (1962, 1967 Creel Census)	4,604 lbs.
Total Annual Harvest	72,256 lbs.

Mortality:

	<u>No Fishing</u>	<u>Present Harvest</u>
Fishing Mortality	0	12%
Natural Mortality	39%	36%
Total Mortality	39%	48%

Table 8. Commercial catfish harvest for years 1965-1974 - Pool 7.*

<u>Year</u>	<u>Pounds</u>
1974	64,269
1973	39,457
1972	85,692
1971	88,406
1970	89,338
1969	63,604
1968	69,595
1967	59,461
1966	53,333
1965	63,365
Average	67,652

* UMRCC.

Figure 1. Pool 7 - Mississippi River Commercial Catfish Study Areas and Net Sites

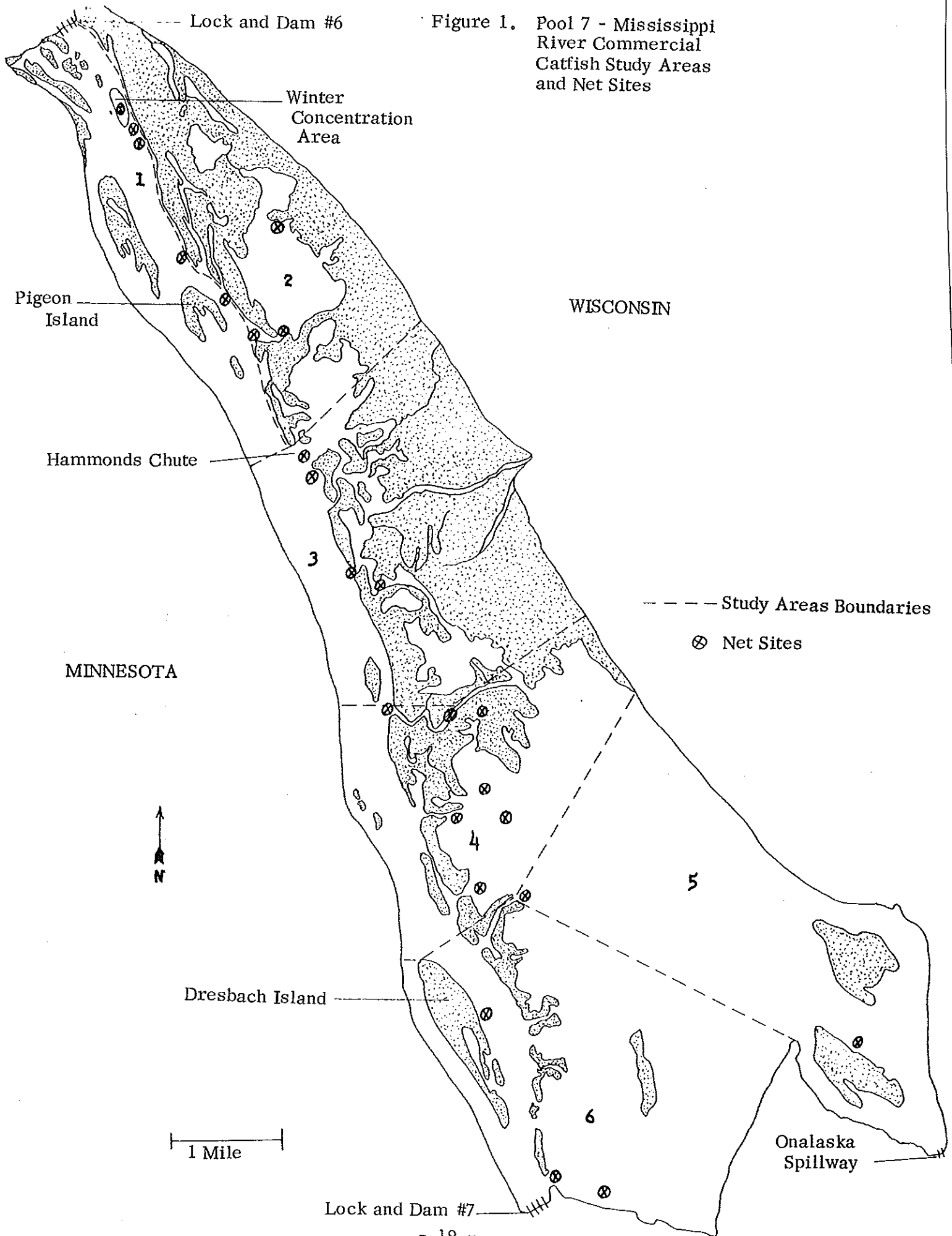
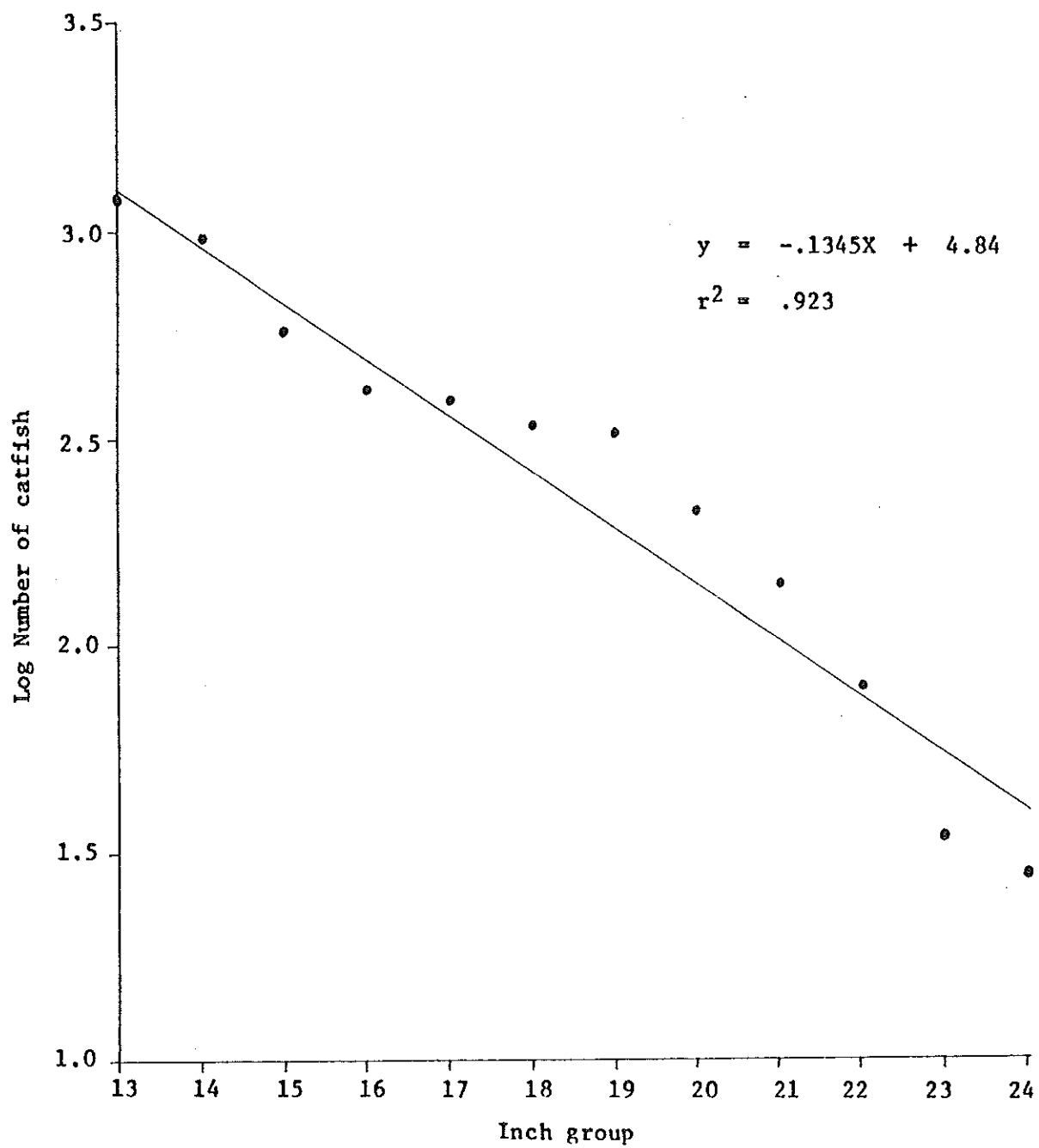


Figure 2. Channel Catfish Catch Curve - Pool 7 - Mississippi River.



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